Luciano Floridi
The Philosophy of Information.
Oxford: Oxford University Press 2011.
xx + 406 pages
$55.00 (cloth ISBN 978–0–19–923238–3); $35.00 (paper ISBN 978–0–19–923239–0)

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Information: A Very Short Introduction.
Oxford: Oxford University Press 2010.
xvi + 138 pages
$11.95 (paper ISBN 978–0–19–955137–8)

In 2010 and 2011, Luciano Floridi produced two books discussing the philosophy of information: *Information*, written for the *Very Short Introduction* series (hereafter IVSI), and the dense, detailed, and ambitiously titled *The Philosophy of Information* (hereafter PI). For those who follow Floridi's work, these publications were an overdue treat. The two books are, of course, completely different in their aim and scope. In this review, I will focus on the larger of the two books. The IVSI will be treated in a way somewhat independent of its intended purpose as a pedagogical tool. I will explore how it can serve as a guide to Floridi's broader philosophy – as a kind of bird's-eye view of the highly detailed treatment of the topic in PI.

Lord John Morley once remarked that 'most books worth reading once are worth reading twice.' Among the books worth reading, there is a more interesting class: those that should not be read once unless one is prepared to read them twice. PI falls into this latter category. This is too simplistic, of course, to be a recommendation, but the point is that so much of what is valuable about this book comes from the threads that hold it together, and a linear reading is bound to miss (or underappreciate) the most important ideas. As much as Floridi tries to offer justifications for the many turns the book takes (and there are many), the ultimate and best justification comes from understanding the place of each in the big picture. To understand (and critique effectively) the book's components, one must take a holistic view. Otherwise, one is in the position of a blind person exploring an elephant.

Let me first present the structure of the book before examining its global threads. In Chapters 1 and 2, Floridi defends the place of the philosophy of information in the landscape of philosophical fields and identifies 18 central questions (themes, really; he lists half-a-dozen sub-problems for each) that the field needs to address. In Chapter 3, he develops the method of Levels of Abstraction (LoA), which will play a central role in the philosophical analysis undertaken by the rest of the book. In Chapters 4 and 7, he explores the connection between information and truth ('truthfulness'). He argues that information 'encapsulates' truthfulness (ch. 4) by endorsing a veridicality thesis, which states that information is meaningful and truthful data. He also defends a *correctness* theory of truth (ch. 7), which has a pragmatic structure (although it is not a pragmatic theory in the traditional sense) because the agent is an essential component of the theory. Between these chapters, in Chapters 5 and 6, he explores the question of the proper origin of meaning for semantic information by discussing the data- (symbol)

grounding problem: 'How can data, constituting semantic information, acquire meaning in the first place?' (134–135). Chapter 5 discusses and critiques existing attempts within Artificial Intelligence to ground symbols, while Chapter 6 presents the positive, 'praxical' solution to the problem derived from action-based semantics. It is in this discussion that agents first make their appearance in the book. Chapters 9 through 12 plunge into epistemology, historically at least, which is the driving force behind Floridi's entire discussion. In Chapter 9, he argues that the traditional doxastic approach to epistemology has stepped into the unsolvable mess of the Gettier problem. (I could not agree more, though not for the same reasons.) In Chapter 10 Floridi develops the modal logic for "being informed" and distinguishes it from standard doxastic and epistemic logics. In Chapter 11, he offers a theory of relevance for information. Finally, in Chapter 12, Floridi offers his account of how relevant information gets upgraded to knowledge: it is accounted for in an information flow network that traces the source of the information and allows the agent to answer further question about the original information. Chapter 13 is something of a diversion. In it, Floridi discusses (in a limited way) Dretske's question, 'How does one know that one is conscious?' While it is not clear why the chapter is a part of this volume except that it demonstrates the applicability of the informational approach to other problems of philosophy, it contains some useful insights that clarify Floridi's global views. Finally, in Chapters 14 and 15, Floridi ventures into ontology. He rejects information-based (*it*-from-a-*bit*) ontologies that insist that the ultimate nature of reality is computational (Ch. 14) and he clarifies and defends a position he describes as 'informational structural realism'. While these chapters may appear to be end-of-book, bold, speculative explorations, they are, in fact, key to understanding the significance of many of the turns taken in the previous chapters.

The book suffers from a legacy problem: most of the chapters are updated versions of articles that appeared independently. Inevitably, the book shows evidence of pressure to force content and arguments to be as self-contained as possible. This pressure explains why the important global threads are not sufficiently emphasized and why some of the arguments appear to be unnecessarily complicated, post-hoc rationalizations of what are very productive theses for the global project. It is easy to see how a superficial reading of the book by an impatient philosopher may lead to a misunderstanding. This may be the case for the argument for the veridicality thesis in Chapter 4 and the thought experiment used to undermine digital ontology. In other places, complex formalism is developed but is never used productively (although it is clearly powerful). Examples include the formal theory of the levels of abstraction introduced in Chapter 3 and the development of the measure of 'informativeness' in Chapter 5.

Now, let us look at a small sample of the important global threads that may be missed or underappreciated by the hasty reader. One is the role the *agent* plays in information semantics and the theory of truth. As remarked above, the agent enters the picture in a theoretically significant way in the chapters on the symbol-grounding problem. The so-called 'praxical' solution is based on the idea that, in the most basic case, an agent can ground its symbols in its own actions (as states of the agent). The agent, therefore, does not have a merely content-determining role; it is, in a sense, part of the content. Floridi's idea seems to be that this grounding in the agent's states can be bootstrapped into a general notion of content in which the referent is an external system. Unfortunately, the move from the praxical solution to a general theory of how 'semantization' happens is underdeveloped in the epistemological investigations that follow. This underdevelopment, of course, is understandable. A full account of how this

could be possible would require a book of its own. Nonetheless, the possibility of such an account, in principle, is assumed in the discussion.

The agent is also central for the correctness theory of truth. An oversimplified description of the correctness theory of truth could be stated as follows: An agent holds some information *I* that may be 'polarized' into a purely semantic component (semantic content) Q and a binary evaluation (an alethic parameter) $A_{0/1}$. The agent has a model *m* of a system *s* that is 'generated' (how?) by the information (so that the structure of *m* is connected to the content *Q* and an appropriate LoA). The theory of truth is a theory about what fixes the alethic parameter. We can say that the content is true (counts as information) *if and only if* the model can be *used* by the agent as a 'proxy' for the system. It is important to note that there is no insistence that 'correspondence' between *m* and *s* fixes the alethic parameter. Instead, connection is maintained by the idea of proxy (which Floridi borrows from computer science) and is expressed by which 'read' and 'write' operations the agent can perform on *m* (not as intentional manipulations of an external object, but as a part of the internal operation of the agent) so that it may interact with *s*. The agent has proximal access to *m* and uses it to gain distal access to *s*.

I use the word 'structure' to describe how the semantic content of information relates to *m*. Floridi never uses the word in such a way in Chapter 8. The idea of structure, however, appears with a vengeance in the final chapter on informational structural realism (ISR). The central idea of his metaphysical stance is that reality (as accessible to semantic agents) fundamentally consists *ontologically* of an informational structure in which the ultimate basic relation is 'difference'. In this relation, Floridi argues, the relation and relata are co-determined. At this point, the idea of a 'model' reemerges again after having disappeared from the epistemological chapters. This time, it is said that the model identifies the structure that is attributed to the system *s* and that the system (the object) itself is the structure (at the given LoA; in general, the object will have more structure than any particular LoA would capture).

It is important to understand that the theories of semantic content and truth and the theory of informational ontology are meant to work together. Floridi's metaphysics and epistemology are not distinct theories; they are but two sides of the same philosophical coin centered on the idea of information. Indeed, at the end of Chapter 1, Floridi suggests that one way (his way) of approaching the philosophy of information is to consider it *Philosophia Prima*. It is easy to interpret this as a suggestion that information is the most important concept in the philosophical conceptual hierarchy, but this would be a mistake. Information is what unifies the epistemological and metaphysical account into the single coin, but it is not separate from it. The connection between the theories of content and truth and the metaphysical theory is somewhat lost in the epistemological chapters, but it is present in the background. A proper understanding of Floridi's account of knowledge cannot be achieved without it.

Another important idea that may go underappreciated is that of levels of abstraction. An idea borrowed from computer science, LoA makes explicit the parameters within which a system is described. The idea certainly receives substantial coverage. It gets a full chapter and appears almost everywhere else. The concept has two roles: (1) as a basis for a philosophical methodology of analysis and (2) as a parameter in the definition of information itself. The method of levels of abstraction is based on the idea that every problem, including every

philosophical problem, must be investigated at a fixed LoA. No LoA-free (absolute) problems are allowed, and overlooked misalignments of LoAs in similarly formulated problems lead to pseudo-problems. Floridi uses this ultimately Kantian strategy to diagnose a number of such problems. As a parameter, it enters every important notion defined (or clarified) by Floridi. The two roles, of course, are related. This is because Floridi's philosophy is reflexive. Philosophy is a constructive activity that reflective semantic agents engage in. It is a type of 'conceptual engineering' (another important global thread) that is itself the product of informational machinery in action. As such, the LoAs of information permeate the philosophical problems they serve to formulate and analyze.

Although LoAs as parameters are present everywhere, they are too often only tagged along in the definitions, and are never given a major structural role in the theory. However, LoAs are more important than Floridi's treatment suggests. Again, this importance comes into play when considering the dual nature, or two-sided coin, of metaphysics and epistemology. LoAs spring from two ideas, each originating from a different side of the coin. One is the Kantian idea that the agents, both in terms of purposes and embodiment, inevitably see the world through the lens of an LoA. The other is that the informational structure of the world is infinitely deep, and every finite representation must therefore begin at some abstracted level.

This is only a sample of the global threads that must be considered and understood (though my understanding is, I am sure, incomplete) to appreciate Floridi's book. I do not endorse them (although I am broadly sympathetic to them, and on more than one occasion I have converged toward similar ideas), but I offer them as a reason to encourage philosophers to read the book – twice!

I will end with a quick review of *Information: A Very Short Introduction*, focusing on its significance as a complementary text to PI. By its very nature, IVSI is only an outline of how the concept of information enters into different fields of knowledge. Floridi starts (Chapter 1) with a discussion of the profound transformational role that information technologies have had in our society (a 'fourth revolution'). This change has led to a reconceptualization (or 're-ontologizing') of our world and a reassessment of our nature and relation to the world. This is followed (Chapter 2) by a discussion and classification of the basic concepts of information and thus the basic taxonomy of the philosophical problems related to information. Chapter 3 briefly presents the mathematical treatment of information, focusing on Shannon's approach. Chapter 4 outlines some limits of the mathematical approach to provide an account of semantic information and identify what the mathematical approach overlooks. Chapter 5 discusses the connection between information and physics, reviewing standard topics such as the relationship of information to thermodynamics (Maxwell's demon) and quantum mechanics (quantum information). The chapter ends with a short discussion of information-based ontologies that have emerged from physics. Chapter 6 addresses information in biology and cognitive science. The chapter is missing much, but it fulfills the goal of demonstrating that there is an interesting role for the concept of information in the natural sciences. Chapter 7 has a similar goal of relating information to the science of economics. Chapter 8 reestablishes the philosophical aim of the volume, focusing on and outlining the central problems of information ethics. The epilogue presents a cautiously optimistic outlook that the technological changes identified in Chapter 1,

provided they are accompanied by sufficient ethical analysis, can allow a successful integration of nature and technology – *physis* and *techne*.

The chapters may be divided into two categories: Chapters 1, 2, 4, and 8 (and the epilogue) present Floridi's approach to information problems. The other chapters outline standard material and incorporate only limited original analysis. Chapters 2 and 4 are directly related to the material in PI. Chapters 1 and 8, however, focus on completely new topics that are nevertheless very important to Floridi. There is a forthcoming book from OUP about each of the topics introduced in these chapters. They will form a set four of which PI is the first volume. As with PI, pieces of these works have already appeared as scholarly articles and conference presentations, but the chapters in IVSI are especially valuable because Floridi expresses himself more boldly in them. Several important ideas that clarify the place of PI in Floridi's philosophy are crystalized. One is the concept of the 'infosphere'; another is the idea of the 'inforg'. An infosphere is the informational environment (and extension of the biosphere) that *info*rmational *org*anisms (i.e., inforgs) inhabit. While Floridi develops the two ideas as emerging out of the analysis of the fourth revolution, what is new is not the idea that there is an infosphere and that we are inforgs. Rather, what is new is the crystallization of an otherwise essential feature of human agency. This gives us a better perspective of the two-sided coin of informational epistemology and metaphysics that emerges in PI and the broadly (neo-)Kantian program of Floridi. It is striking how human-centric Floridi's outlook is. Elements of this are present in PI, for example, at the end of Chapter 6 and in parts of Chapter 13. However, IVSI makes this more explicit. Indeed, considering that semantic information is at the core of Floridi's philosophy of information, he views semantization, and thus the infosphere, as the exclusive (and lonely?) domain of humanity. This is the place where I diverge most strongly from Floridi.

Putting aside the pedagogical value of IVSI, and until the other three books in a projected quartet come out (*The Ethics of Information* comes out in 2013, the other two *The Policies of Information* and *The Elements of Information* are in progress), this short volume should be read together with *The Philosophy of Information*.

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